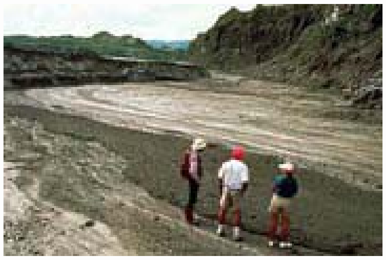
Volcanic Mudflow

These lethal mixtures of water and *tephra* have the consistency of wet concrete, yet they can flow down the slopes of volcanoes or down river valleys at rapid speeds, similar to fast-moving streams of water. These mud slurries carry debris ranging in size from *ash* to *lapilli*, to boulders more than 10 meters in diameter. Mudflow can vary from hot to cold, depending on their mode of genesis. The maximum temperature of a mudflow is 100 degrees Centigrade, the boiling temperature of water.

El Palmar mudflow, Guatemala (1989)



Mt. Pinatubo mudflowPhilippines (1991)

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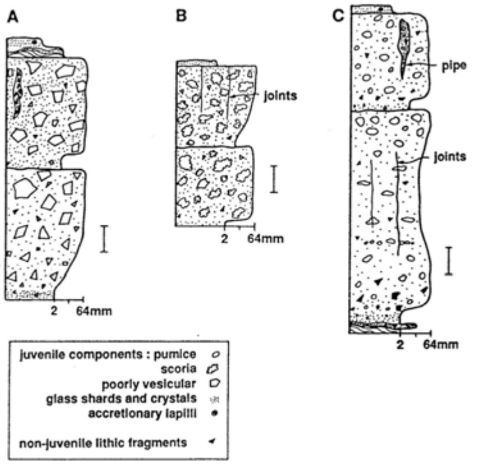
A
B
C
joints
pipe
joints
2
64mm
2
64mm
2
64mm
juvenile components : pumice
scoria
poorly vesicular
glass shards and crystals
accretionary lapilli
non-juvenile lithic fragments

Fig. 40—Schematic graphic logs of three types of primary pyroclastic flow deposits. (A) Block and ash flow deposit, overlain by co-genetic ash cloud surge and fine grained fallout deposits. Based on Fisher and Heiken (1982). (B) Scoria and ash flow deposit. Based on Nairn and Self (1978). (C) Pumiceous pyroclastic flow deposit, or ignimbrite, underlain by co-genetic ground surge deposits and a thin ground layer, and overlain by a co-ignimbrite fine ash fallout deposit. Based on Sparks et al. (1973). The scale bars in (A) and (B) are about 1 m, and in (C) 1 to 10 m.

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3. Pyroclastic surge deposits

Lateral flow of pyroclastic materials (low concentration volcanic particles, gases, and water) which flow on heat gas turbulent.

pyroclastic surge form directly from explosive eruption phreatomagnetic and phreatic (base surge) and associate with eruption and emplacement pyroclastic flow (ash cloud surge and ground surge).

Characteristic of this deposits showing cross stratification, dunes, planar lamination, anti dunes, pind and swell, this deposit thicker on low altitude and thiner on high altitude, accumulated near the vent.

Types of pyroclastic surge deposits

- Base surge : associate with pyroclastic fall deposits
- Ground surge : associate with pyroclastic flow deposits
- Ash cloud surge : normally on the top of pyroclastic flow deposits

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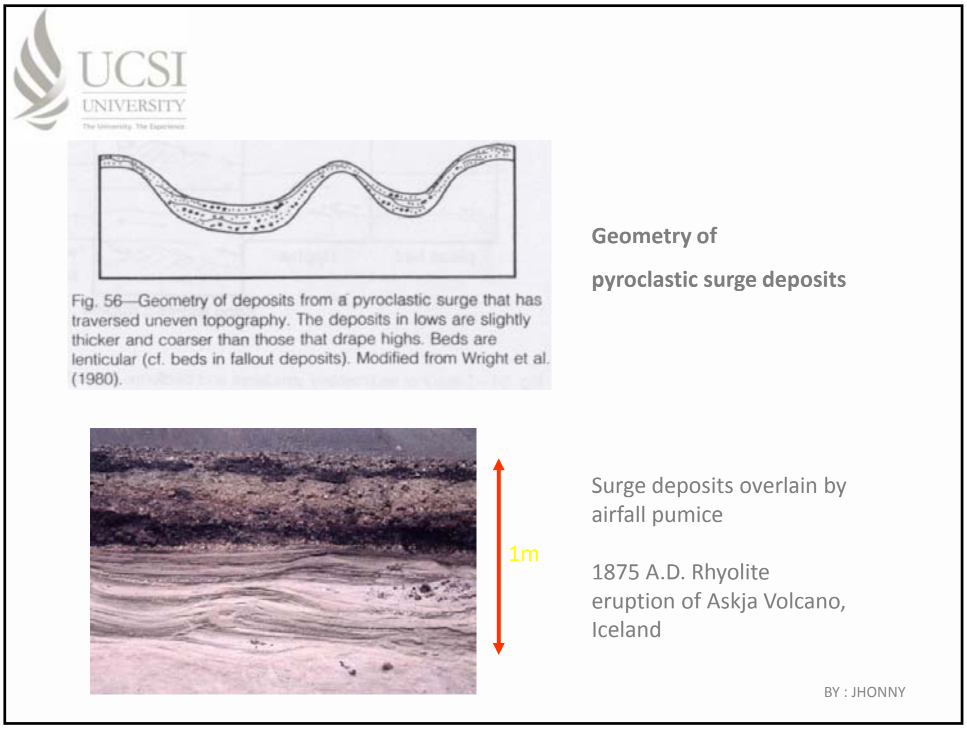


Fig. 56—Geometry of deposits from a pyroclastic surge that has traversed uneven topography. The deposits in lows are slightly thicker and coarser than those that drape highs. Beds are lenticular (cf. beds in fallout deposits). Modified from Wright et al. (1980).

Geometry of

pyroclastic surge deposits

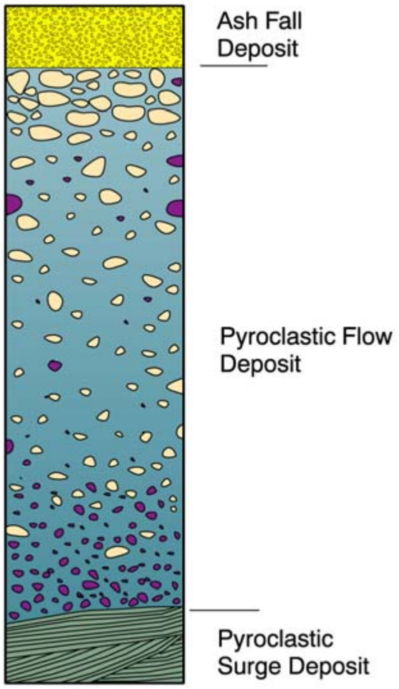
Surge deposits overlain by airfall pumice

1875 A.D. Rhyolite eruption of Askja Volcano, Iceland

BY : JHONNY

Pyroclastic Surge Deposits

Section through a typical ignimbrite, showing basal surge deposit, middle flow, and upper ash fall cover. Tan blocks represent pumice, and purple represents denser lithic fragments. After Sparks et al. (1973).



Classification of pyroclastic rock (Modification from Schmid, 1981 & Fisher et.al., 1984)

Clast Size	*Pyroclast*	*Pyroclastic Deposit unconsolidated : Tephra*	*Pyroclastic Deposit consolidated: pyroclastic rock*
64 mm	Block (angular) Boom (rounded)	Agglomerate, blocks/booms bedding or blocks/booms tephra	Agglomerate, Pyroclastic breccia
2 mm	Lapilli	Lapilli bedding or Lapilli tephra	Lapilli rock
1/16 mm	Coarse ash	Coarse ash	Coarse tuff
	Fine ash	Fine ash	Fine tuff

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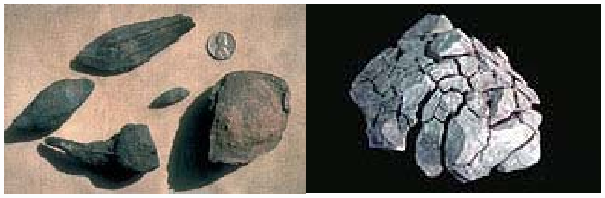
PYROCLAST SIZE

ASH -- Very fine-grained fragments (< 2 mm), generally dominated by broken glass shards, but with variable amounts of broken crystal and lithic (rock) fragments. *Courtesy of USGS.*

LAPILLI -- Pea- to walnut-size pyroclasts (2 to 64 mm). They often look like cinders. In water-rich eruptions, the accretion of wet ash may form rounded spheres known as *accretionary lapilli* (left). *Courtesy of USGS.*



BLOCKS AND BOMBS -- Fragments >64 mm. Bombs are ejected as incandescent lava fragments which were semi-molten when airborne, thus inheriting streamlined, aerodynamic shapes. Blocks (not shown) are ejected as solid fragments with angular shapes. *Courtesy of J.P. Lockwood, USGS.*

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